Amendments to the Claims:

1. (Original) A method of forming a patterned layer of a photocured perfluoropolyether, the method comprising:

(a) providing a substrate, wherein the substrate comprises a patterned surface;

(b) contacting a perfluoropolyether precursor with the patterned surface of the substrate; and

(c) photocuring the perfluoropolyether precursor to form a patterned layer of a photocured perfluoropolyether.

2. (Original) The method of claim 1, comprising:

(a) coating the patterned surface of the substrate with a blend of a perfluoropolyether precursor and a photoinitiator to form a coated, patterned substrate;

(b) exposing the coated, patterned substrate to ultraviolet radiation for a period of time to form a layer of a photocured perfluoropolyether on the patterned substrate; and

(c) removing the layer of the photocured perfluoropolyether from the patterned substrate to produce a patterned layer of the photocured perfluoropolyether.

3. (Original) The method of claim 2, wherein the perfluoropolyether precursor comprises an end functionalized perfluoropolyether.

4. (Original) The method of claim 2, wherein the photoinitiator comprises 2,2-dimethoxy-2-phenyl acetophenone.

5. (Original) The method of claim 2, wherein the photocured perfluoropolyether comprises a perfluoropolyether dimethacrylate.

6. (Original) The method of claim 2, wherein the photocured perfluoropolyether comprises a perfluoropolyether distyrenic.

7. (Original) The method of claim 2, wherein the patterned substrate comprises an etched silicon wafer.

8. (Original) The method of claim 2, wherein the patterned substrate comprises a photoresist patterned substrate.

9. (Original) The method of claim 2, wherein the coating step comprises a spin-coating step.

10. (Original) The method of claim 2, wherein the ultraviolet radiation has a wavelength of about 365 nanometers.

11. (Original) The method of claim 2, wherein the period of time of the ultraviolet radiation ranges from about one second to about 300 seconds.

12. (Original) The method of claim 11, wherein the period of time of the ultraviolet radiation ranges from about one second to about 100 seconds.

13. (Original) The method of claim 12, wherein the period of time of the ultraviolet radiation is about 60 seconds.

14. (Original) The method of claim 12, wherein the period of time of the ultraviolet radiation is about 6 seconds.

15. (Original) The method of claim 2, wherein the patterned layer of the photocured perfluoropolyether is between about 1 micrometers and about 100 micrometers thick.

16. (Original) The method of claim 15, wherein the patterned layer of the photocured perfluoropolyether is between about 1 micrometer and about 50 micrometers thick.

17. (Original) The method of claim 16, wherein the patterned layer of the photocured perfluoropolyether is about 20 micrometers thick.

18. (Original) The method of claim 2, wherein the patterned layer of the photocured perfluoropolyether is between about 0.1 millimeters and about 10 millimeters thick.

19. (Original) The method of claim 18, wherein the patterned layer of the photocured perfluoropolyether is about 5 millimeters thick.

20. (Original) The method of claim 1, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of microscale channels.

21. (Original) The method of claim 20, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

22. (Original) The method of claim 21, wherein the microscale channels of the integrated network intersect at predetermined points.

23. (Original) The method of claim 1, comprising forming a plurality of holes in the patterned layer of the photocured perfluoropolyether.

24. (Original) The method of claim 23, wherein at least one of the plurality of holes comprises an inlet aperture.

25. (Original) The method of claim 23, wherein at least one of the plurality of holes comprises an outlet aperture.

26. (Original) The method of claim 23, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

27. (Original) The method of claim 2, comprising:

(a) overlaying a first patterned layer of the photocured perfluoropolyether on a second patterned layer of the photocured perfluoropolyether, wherein the patterns of the first and second layers of the photocured perfluoropolyether are aligned in a predetermined alignment; and

(b) exposing the first and the second layers of the photocured perfluoropolyether to ultraviolet radiation for a period of time.

28. (Original) The method of claim 27, wherein the first and the second patterned layers of the photocured perfluoropolyether adhere to one another.

29. (Original) The method of claim 27, wherein the first patterned layer of the photocured perfluoropolyether is about 5 millimeters thick.

30. (Original) The method of claim 27, wherein the second patterned layer of the photocured perfluoropolyether is about 20 micrometers thick.

31. (Original) The method of claim 27, wherein the predetermined alignment of the first and second layers of the photocured perfluoropolyether forms a plurality of microscale channels.

32. (Original) The method of claim 31, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

33. (Original) The method of claim 32, wherein the microscale channels of the integrated network intersect at predetermined points.

34. (Original) The method of claim 27, comprising forming a plurality of holes in the first patterned layer of the photocured perfluoropolyether.

35. (Original) The method of claim 34, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

36. (Canceled).

37. (Original) A microfluidic device comprising a patterned layer of a photocured perfluoropolyether.

38. (Original) The microfluidic device of claim 37, wherein the photocured perfluoropolyether is selected from one of a perfluoropolyether dimethacrylate and a perfluoropolyether distyrenic, or a combination thereof.

39. (Original) The microfluidic device of claim 37, wherein the patterned layer of the photocured perfluoropolyether is between about 1 micrometers and about 100 micrometers thick.

40. (Original) The microfluidic device of claim 39, wherein the patterned layer of the photocured perfluoropolyether is about 20 micrometers thick.

41. (Original) The microfluidic device of claim 37, wherein the patterned layer of the photocured perfluoropolyether is between about 0.1 millimeters and about 10 millimeters thick.

42. (Original) The microfluidic device of claim 41, wherein the patterned layer of the photocured perfluoropolyether is about 5 millimeters thick.

43. (Original) The microfluidic device of claim 37, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of microscale channels.

44. (Original) The microfluidic device of claim 43, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

45. (Original) The microfluidic device of claim 44, wherein the microscale channels of the integrated network intersect at predetermined points.

46. (Original) The microfluidic device of claim 37, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of holes.

47. (Original) The microfluidic device of claim 46, wherein at least one of the plurality of holes comprises an inlet aperture.

48. (Original) The microfluidic device of claim 46, wherein at least one of the plurality of holes comprises an outlet aperture.

49. (Original) The microfluidic device of claim 46, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

50. (Original) A microfluidic device comprising a first patterned layer of a photocured perfluoropolyether and a second patterned layer of a photocured perfluoropolyether, wherein

(a) the first patterned layer of the photocured perfluoropolyether is overlaid on the second patterned layer of the photocured perfluoropolyether; and

(b) the patterns of the first and second layers of the photocured perfluoropolyether are aligned in a predetermined alignment.

51. (Original) The microfluidic device of claim 50, wherein the first and the second patterned layers of the photocured perfluoropolyether adhere to one another.

52. (Original) The microfluidic device of claim 50, wherein the first patterned layer of the photocured perfluoropolyether is about 5 millimeters thick.

53. (Original) The microfluidic device of claim 50, wherein the second patterned layer of the photocured perfluoropolyether is about 20 micrometers thick.

54. (Original) The microfluidic device of claim 50, wherein the predetermined alignment of the first and second layers of the photocured perfluoropolyether forms a plurality of microscale channels.

55. (Original) The microfluidic device of claim 54, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

56. (Original) The microfluidic device of claim 55, wherein the microscale channels of the integrated network intersect at predetermined points.

57. (Original) The microfluidic device of claim 50, wherein at least one of the patterned layers of the photocured perfluoropolyether comprises a plurality of holes.

58. (Original) The microfluidic device of claim 57, wherein at least one of the plurality of holes comprises an inlet aperture.

59. (Original) The microfluidic device of claim 57, wherein at least one of the plurality of holes comprises an outlet aperture.

60. (Original) The microfluidic device of claim 57, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

61. (Original) A microfluidic device comprising a patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises a solvent disposed therein.

62. (Original) The microfluidic device of claim 61, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of microscale channels, and wherein the solvent is disposed in one or more of the channels.

63. (Original) The microfluidic device of claim 62, wherein at least one of the microscale channels comprises a fluid reservoir, and wherein the solvent is disposed in the fluid reservoir.

64. (Original) The microfluidic device of claim 62, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

65. (Original) The microfluidic device of claim 64, wherein the microscale channels of the integrated network intersect at predetermined points.

66. (Original) The microfluidic device of claim 61, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of holes.

67. (Original) The microfluidic device of claim 66, wherein at least one of the plurality of holes comprises an inlet aperture.

68. (Original) The microfluidic device of claim 66, wherein at least one of the plurality of holes comprises an outlet aperture.

69. (Original) The microfluidic device of claim 66, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

70. (Original) The microfluidic device of claim 66, wherein one or more of the plurality of holes is reversibly sealed.

71. (Original) The microfluidic device of claim 61, wherein the solvent comprises an organic solvent.

72. (Original) A microfluidic device comprising a patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises one or more chemical reactants disposed therein.

73. (Original) The microfluidic device of claim 72, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of microscale channels, and wherein the one or more chemical reactants is disposed in one or more of the channels.

74. (Original) The microfluidic device of claim 73, wherein at least one of the microscale channels comprises a fluid reservoir, and wherein the one or more chemical reactants is disposed in the fluid reservoir.

75. (Original) The microfluidic device of claim 74, wherein at least one of the microscale channels comprises a reaction chamber in fluid communication with the fluid reservoir, and wherein the one or more chemical reactants is disposed in the reaction chamber.

76. (Original) The microfluidic device of claim 73, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

77. (Original) The microfluidic device of claim 76, wherein the microscale channels of the integrated network intersect at predetermined points.

78. (Original) The microfluidic device of claim 72, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of holes.

79. (Original) The microfluidic device of claim 78, wherein at least one of the plurality of holes comprises an inlet aperture.

80. (Original) The microfluidic device of claim 78, wherein at least one of the plurality of holes comprises an outlet aperture.

81. (Original) The microfluidic device of claim 78, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

82. (Original) The microfluidic device of claim 78, wherein one or more of the plurality of holes is reversibly sealed.

83. (Original) A microfluidic device comprising a patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises one or more reaction products disposed therein.

84. (Original) The microfluidic device of claim 83, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of microscale channels, and wherein the one or more reaction products is disposed in one or more of the channels.

85. (Original) The microfluidic device of claim 84, wherein at least one of the microscale channels comprises a reaction chamber, and wherein the one or more reaction products is disposed in the reaction chamber.

86. (Original) The microfluidic device of claim 85, wherein at least one of the microscale channels comprises a fluid reservoir in fluid communication with the reaction chamber, and wherein the one or more reaction products is disposed in the reaction chamber.

87. (Original) The microfluidic device of claim 84, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

88. (Original) The microfluidic device of claim 87, wherein the microscale channels of the integrated network intersect at predetermined points.

89. (Original) The microfluidic device of claim 83, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of holes.

90. (Original) The microfluidic device of claim 89, wherein at least one of the plurality of holes comprises an inlet aperture.

91. (Original) The microfluidic device of claim 89, wherein at least one of the plurality of holes comprises an outlet aperture.

92. (Original) The microfluidic device of claim 89, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

93. (Original) The microfluidic device of claim 89, wherein one or more of the plurality of holes is reversibly sealed.

94. (Original) A microfluidic device comprising a patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises one or more chemical reactants and one or more reaction products disposed therein.

95. (Original) The microfluidic device of claim 94, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of microscale channels, and wherein the one or more chemical reactants and the one or more reaction products are disposed in one or more of the channels.

96. (Original) The microfluidic device of claim 95, wherein at least one of the microscale channels comprises a first fluid reservoir, and wherein the one or more chemical reactants is disposed in the first fluid reservoir.

97. (Original) The microfluidic device of claim 96, wherein at least one of the microscale channels comprises a reaction chamber in fluid communication with the fluid reservoir, and wherein the one or more chemical reactants and the one or more reaction products are disposed in the reaction chamber.

98. (Original) The microfluidic device of claim 97, wherein at least one of the microscale channels comprises a second fluid reservoir in fluid communication with the reaction chamber, and wherein the one or more reaction products is disposed in the second fluid reservoir.

99. (Original) The microfluidic device of claim 95, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

100. (Original) The microfluidic device of claim 99, wherein the microscale channels of the integrated network intersect at predetermined points.

101. (Original) The microfluidic device of claim 95, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of holes.

102. (Original) The microfluidic device of claim 101, wherein at least one of the plurality of holes comprises an inlet aperture.

103. (Original) The microfluidic device of claim 101, wherein at least one of the plurality of holes comprises an outlet aperture.

104. (Original) The microfluidic device of claim 101, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

105. (Original) The microfluidic device of claim 101, wherein one or more of the plurality of holes is reversibly sealed.

106. (Original) A method of flowing a material in a microfluidic device, the method comprising:

(a) providing a microfluidic device comprising at least one patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises at least one microscale channel; and

(b) flowing a material in the microscale channel.

107. (Original) The method of claim 106, comprising disposing a material in the microfluidic device.

108. (Original) The method of claim 106, comprising applying a driving force to move the material along the microscale channel.

109. (Original) The method of claim 106, further comprising a plurality of microscale channels.

110. (Original) The method of claim 109, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

111. (Original) The method of claim 110, wherein the microscale channels of the integrated network intersect predetermined points.

112. (Original) The method of claim 106, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of holes.

113. (Original) The method of claim 112, wherein at least one of the plurality of holes comprises an inlet aperture.

114. (Original) The method of claim 112, wherein at least one of the plurality of holes comprises an outlet aperture.

115. (Original) The method of claim 112, comprising at least one pressure actuated valve, wherein the pressure actuated valve is defined by one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

116. (Original) The method of claim 115, wherein the pressure actuated valve is actuated by introducing a pressurized fluid into one of:

(a) a microscale channel; and

(b) at least one of the plurality of holes.

117. (Original) The method of claim 116, wherein the pressurized fluid has a pressure between about 10 psi and about 40 psi.

118. (Original) The method of claim 117, wherein the pressure is about 25 psi.

119. (Original) The method of claim 106, wherein the material comprises a fluid.

120. (Original) The method of claim 119, wherein the fluid comprises a solvent.

121. (Original) The method of claim 120, wherein the solvent comprises an organic solvent.

122. (Original) The method of claim 106, wherein the material flows in a predetermined direction along the microscale channel.

123. (Original) A method of performing at least one chemical reaction, the method comprising:

(a) providing a microfluidic device comprising a patterned layer of a photocured perfluoropolyether; and

(b) contacting a first reagent and a second reagent in the microfluidic device to form at least one reaction product.

124. (Original) The method of claim 123, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of microscale channels.

125. (Original) The method of claim 124, wherein at least one of the microscale channels comprises a fluid reservoir.

126. (Original) The method of claim 125, wherein at least one of the microscale channels comprises a fluid reaction chamber in fluid communication with the fluid reservoir.

127. (Original) The method of claim 124, wherein the plurality of microscale channels comprises an integrated network of microscale channels.

128. (Original) The method of claim 127, wherein the microscale channels of the integrated network intersect at predetermined points.

129. (Original) The method of claim 123, wherein the first reagent and the second reagent are disposed in separate channels of the microfluidic device.

130. (Original) The method of claim 123, comprising flowing the first reagent and the second reagent in a predetermined direction in the microfluidic device.

131. (Original) The method of claim 123, wherein the contacting of the first reagent and the second reagent is performed in a microscale reaction chamber.

132. (Original) The method of claim 123, comprising flowing the reaction product in a predetermined direction in the microfluidic device.

133. (Original) The method of claim 123, comprising recovering the reaction product.

134. The method of claim 133, comprising flowing the reaction product to an outlet aperture of the microfluidic device.

135. (Original) The method of claim 123, comprising contacting the reaction product with a third reagent to form a second reaction product.

136. (Original) The method of claim 123, wherein the first reagent and the second reagent comprise an organic solvent.

137. (Original) The method of claim 123, wherein the chemical reaction comprises a nanoscale chemical reaction.

138. (Original) A reaction product formed by the method of claim 123.

139. (Original) The method of claim 123, wherein the first reagent and the second reagent are independently selected from one of a nucleotide and a polynucleotide.

140. (Original) The method of claim 139, wherein the reaction product comprises a polynucleotide.

141. (Original) The method of claim 140, wherein the polynucleotide is DNA.

142. (Original) A reaction product formed by the method of claim 139.

143. (Original) A method of screening a sample for a characteristic, the method comprising:

(a) providing a microfluidic device comprising a patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of channels;

(b) providing a target material;

(c) disposing the sample in at least one of the plurality of channels;

(d) contacting the sample with the target material; and

(e) detecting an interaction between the sample and the target material, wherein the presence or the absence of the interaction is indicative of the characteristic of the sample.

144. (Original) The method of claim 143, comprising disposing the target material in at least one of the plurality of channels.

145. (Original) The method of claim 143, wherein the target material comprises a substrate.

146. (Original) The method of claim 145, wherein at least one of the plurality of channels of the microfluidic device is in fluid communication with the substrate.

147. (Original) The method of claim 143, wherein the target material is disposed on a substrate.

148. (Original) The method of claim 147, wherein at least one of the plurality of channels of the microfluidic device is in fluid communication with the target material disposed on the substrate.

149. (Original) The method of claim 143, comprising disposing a plurality of samples in at least one of the plurality of channels.

150. (Original) The method of claim 143, wherein the sample is selected from the group consisting of a therapeutic agent, a diagnostic agent, a research reagent, a catalyst, a metal ligand, a non-biological organic material, an inorganic material, a foodstuff, soil, water, and air.

151. (Original) The method of claim 143, wherein the sample comprises one or more members of one or more libraries of chemical or biological compounds or components.

152. (Original) The method of claim 143, wherein the sample comprises one or more of a nucleic acid template, a sequencing reagent, a primer, a primer extension product, a restriction enzyme, a PCR reagent, a PCR reaction product, or a combination thereof.

153. (Original) The method of claim 143, wherein the sample comprises one or more of an antibody, a cell receptor, an antigen, a receptor ligand, an enzyme, a substrate, an immunochemical, an immunoglobulin, a virus, a virus binding component, a protein, a cellular factor, a growth factor, an inhibitor, or a combination thereof.

154. (Original) The method of claim 143, wherein the target material comprises one or more of an antigen, antibody, an enzyme, a restriction enzyme, a dye, a fluorescent dye, a sequencing reagent, a PCR reagent, a primer, a receptor, a ligand, a chemical reagent, or a combination thereof.

155. (Original) The method of claim 143, wherein the interaction comprises a binding event.

156. (Original) The method of claim 143, wherein the detecting of the interaction is performed by at least one or more of a spectrophotometer, a fluorometer, a photodiode, a photomultiplier tube, a microscope, a scintillation counter, a camera, a CCD camera, film, an optical detection system, a temperature sensor, a conductivity meter, a potentiometer, an amperometric meter, a pH meter, or a combination thereof.

157. (Original) A method of dispensing a material, the method comprising:

(a) providing a microfluidic device comprising a patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of channels, and wherein at least one of the plurality of channels comprises an outlet aperture;

(b) providing at least one material;

(c) disposing at least one material in at least one of the plurality of channels; and

(d) dispensing at least one material through the outlet aperture.

158. (Original) The method of claim 157, wherein the material comprises a drug.

159. (Original) The method of claim 158, comprising metering a predetermined dosage of the drug.

160. (Original) The method of claim 159, comprising dispensing the predetermined dosage of the drug.

161. (Original) The method of claim 157, wherein the material comprises an ink composition.

162. (Original) The method of claim 161, comprising dispensing the ink composition on a substrate.

163. (Original) The method of claim 162, wherein the dispensing of the ink composition on a substrate forms a printed image.

164. (Original) A method of separating a material, the method comprising:

(a) providing a microfluidic device comprising a patterned layer of a photocured perfluoropolyether, wherein the patterned layer of the photocured perfluoropolyether comprises a plurality of channels, and wherein at least one of the plurality of channels comprises a separation region;

(b) disposing a mixture comprising at least a first material and a second material in the microfluidic device;

(c) flowing the mixture into at least one of the plurality of channels comprising a separation region; and

(d) separating the first material from the second material in the separation region to form at least one separated material.

165. (Original) The method of claim 164, wherein the separation region comprises a chromatographic material.

166. (Original) The method of claim 165, wherein the chromatographic material is selected from the group consisting of a size-separation matrix, an affinity-separation matrix; and a gel-exclusion matrix, or a combination thereof.

167. (Original) The method of claim 164, wherein the first or second material comprises one or more members of one or more libraries of chemical or biological compounds or components.

168. (Original) The method of claim 164, wherein the first or second material comprises one or more of a nucleic acid template, a sequencing reagent, a primer, a primer extension product, a restriction enzyme, a PCR reagent, a PCR reaction product, or a combination thereof.

169. (Original) The method of claim 164, wherein the first or second material comprises one or more of an antibody, a cell receptor, an antigen, a receptor ligand, an enzyme, a substrate, an immunochemical, an immunoglobulin, a virus, a virus binding component, a protein, a cellular factor, a growth factor, an inhibitor, or a combination thereof.

170. (Original) The method of claim 164, comprising detecting the separated material.

171. (Original) The method of claim 170, wherein the detecting of the separated material is performed by at least one or more of a spectrophotometer, a fluorometer, a photodiode, a photomultiplier tube, a microscope, a scintillation counter, a camera, a CCD camera, film, an optical detection system, a temperature sensor, a conductivity meter, a potentiometer, an amperometric meter, a pH meter, or a combination thereof.